

C. D. LANNING.

COHERER.

APPLICATION FILED DEC. 1, 1902. RENEWED DEC. 13, 1910.

1,019,260.

Patented Mar. 5, 1912.

2 SHEETS—SHEET 1.

Fig. 6.

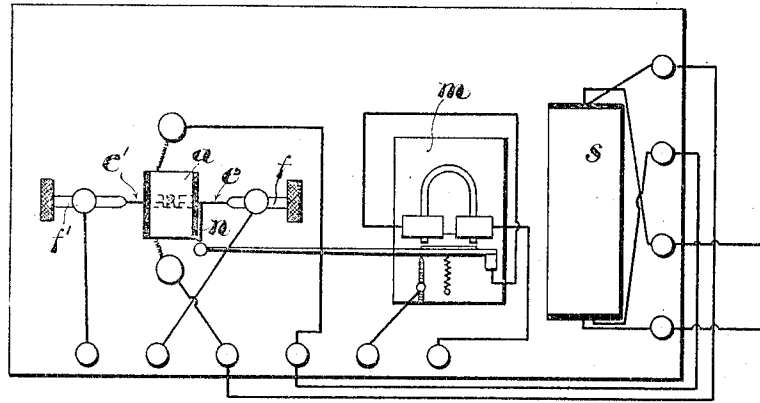


Fig. 7.

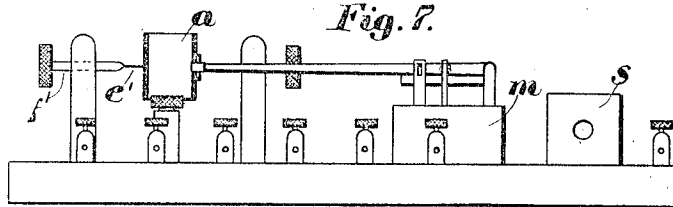


Fig. 1.

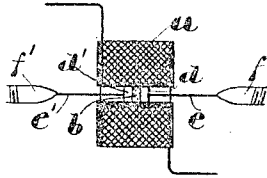


Fig. 2.

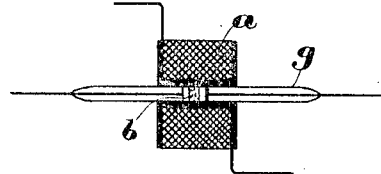
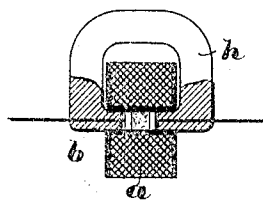


Fig. 3.



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Inventor:

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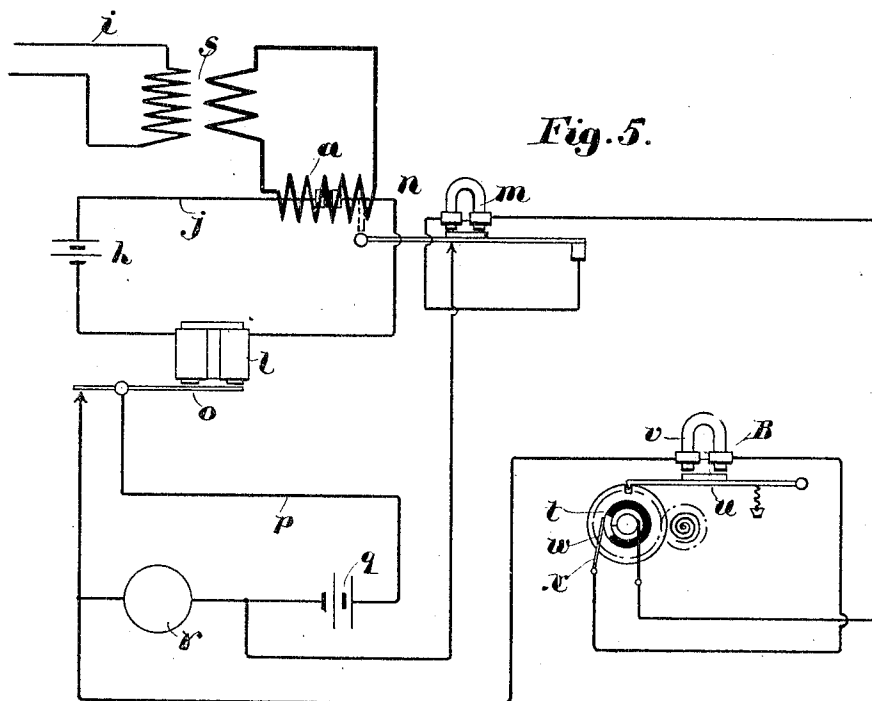
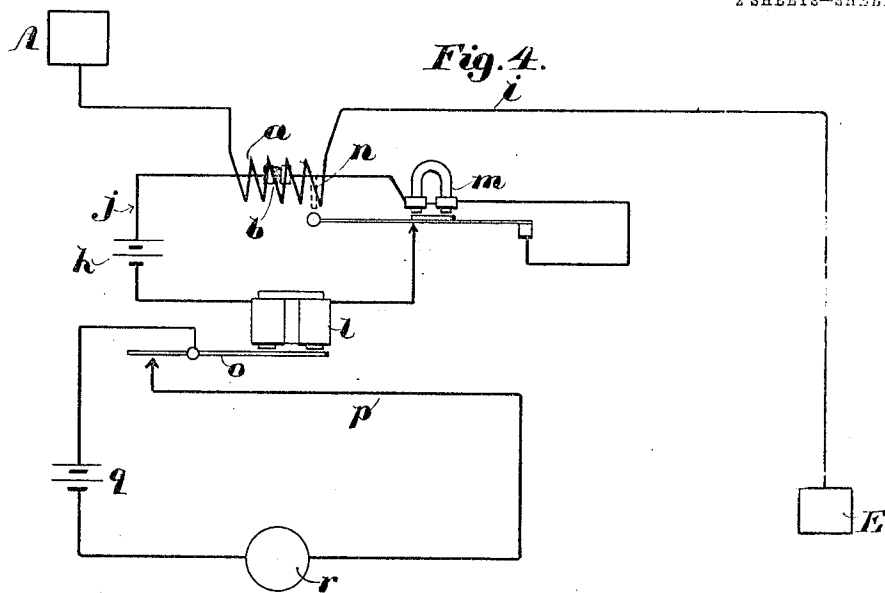
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2 SHEETS-SHEET 2.



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Walter E. Lombard
Thomas B. Booth

Inventor:
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UNITED STATES PATENT OFFICE.

CHARLES D. LANNING, OF BOSTON, MASSACHUSETTS.

COHERER.

1,019,260.

Specification of Letters Patent.

Patented Mar. 5, 1912.

Application filed December 1, 1902, Serial No. 133,335. Renewed December 13, 1910. Serial No. 597,151.

To all whom it may concern:

Be it known that I, CHARLES D. LANNING, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Coherers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 My invention relates to imperfect contacts used in receiving apparatus for electric currents and particularly to those forms of imperfect contacts known as "coherers," having reference to the means employed for

15 temporarily rendering such normally imperfect contacts more perfect and to other elements with which such contacts may be combined.

As usually employed in well-known forms of coherers, such, for instance, as those used by Marconi, the local circuit which it is desired to control, passes through the coherer and the receiving circuit for causing coherence in the coherer and controlling the local

25 circuit also passes through the coherer in parallel with the local circuit. An electrical impulse of some kind being received, the contact or coherer is influenced thereby, so as to increase its conductivity and the local

30 circuit is thereupon completed and the appropriate apparatus actuated.

My invention provides a new and improved form of coherer, together with an improved means for actuating the same, providing, when it is so desired, an actuating

35 circuit and a coherer circuit normally out of electrical contact with each other.

My invention will be best understood from a description and illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

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Referring to the drawings,—Figure 1 is a view in section showing a coherer within an actuating coil in the receiving circuit and illustrating one embodiment of my invention; Fig. 2 shows a modification of the arrangement illustrated in Fig. 1; Fig. 3 shows a further modification of the same; Fig. 4 shows diagrammatically a receiving

50 circuit with the associated parts combined therewith employing a coherer actuated as shown in Fig. 1; Fig. 5 is a diagrammatic view of a receiving device employing a

55 periodically interrupted tapper for the co-

herer; Fig. 6 is a plan view of a portion of the receiving apparatus diagrammatically shown in Fig. 5; and, Fig. 7 is a side elevation of the same.

In the drawing, referring particularly to Fig. 1, *a* is a coherer actuating coil adapted to be placed preferably in series with the receiving circuit or in a secondary circuit inductively related to the receiving circuit. This actuating coil is preferably arranged, as shown, in the form of a helix upon a

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spool or otherwise wound, so as to provide an opening along the line of its magnetic axis for the reception of the coherer or imperfect contact, *b*. As here shown, this coherer comprises a number of granular particles of magnetic material interposed within the bore of the coil spool, which may be of hard rubber or other material between the terminal plates or plugs, *d, d'*. The latter are suitably connected by the adjustably mounted rods, *e, e'*, to the local coherer circuit, being preferably in series with the same. The rods, *e, e'*, are supported between the adjustable thumb screws, *f* and *f'*, whereby provision is made for delicately adjusting the position of the coherer relatively to the magnetic field created by the coil *a* as well as varying the contact between the individual coherer particles.

The particles *b* are so arranged as to permit of a certain freedom of movement, the circuit, passing through the coherer at or during periods of deenergization of the actuating coil, being normally broken or interrupted for the passage of any appreciable current therethrough, on account of the insufficient, imperfect or irregular contact of the loosely separated magnetic particles between the conducting plates, *d, d'*. I have found however, that on passage of an electric impulse through the coil *a*, inducing thereby a magnetic field having the resultant of its lines of force substantially coincident with the axis of the coherer, the loose individual particles therein assume a position with their longest axes parallel with the axis of the coherer and are forced into such a state of cohesion as to render the coherer circuit sufficiently conductive to afford transmission therethrough of an appreciable current or of sufficient energy for the actuation of a suitable translating device which is normally inoperative or unactuated during periods of deenergization of the ac-

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tuating coil. This form of coherer with its actuating coil may be utilized in the receiving circuits of Hertzian wave system in place of the ordinary forms of coherer, or may be employed in other suitable relations to respond to any desired manifestation of electrical energy,—such, for instance, as slight telephonic currents,—it being understood that the electrical proportions of the coil, as well as the form and arrangement of the same will be varied to suit the demands of the occasion, and will be determined by principles well-known to those skilled in the art. In Fig. 2, I have shown a similar coherer actuating coil with the contact inclosed within a glass coherer tube, *g*, as is ordinarily employed.

Fig. 3 illustrates a form of coherer similar to that shown in Fig. 1, the actuating coil or helix, however, being wound upon a core, *h*, of magnetic material, a gap being provided in said core and within the coil to afford a suitable location for the coherer itself, being suitably insulated from the core, and the conductors, *e*, *e'*. Any form of tube or inclosure for the coherer contact may be employed, and any form of coherer contact may be used, it being obvious that my invention is not limited to the granular contact in the coherer shown, the specific details for which, are submitted for illustrative purposes only. It will also be obvious that the coherer which I have illustrated may be arranged in any suitable electro-magnetic relation to the receiving circuit, the actuating helix which I have shown and the position of the coherer therein, being well suited to carry out my invention in practice, the position shown in Fig. 1 serving to bring an intimate relation between the coherer and the magnetism created by the coil.

In Fig. 4 I have shown diagrammatically an arrangement of circuits for the receipt of Hertzian waves. The receiving circuit *i* passes from the conducting plate, *A*, through the actuating helix, *a*, to the ground plate *E*. The coherer or contact *b* is suitably placed within the electro-magnetic influence of the coil *a* and is in series with the coherer or local circuit *j* containing the battery *h*, relay *l*, tapper *m*. The latter may comprise any suitable form of tapper adapted to shake the contact or cause decoherence thereof. I have herein shown the same to consist of an ordinary interrupter, the armature of which is adapted to engage with a projecting stud or pin suitably attached or connected to the coherer tube. The relay magnet *l* is adapted to actuate its armature *o*, and thereby make circuit *p* containing battery *q* and translating device *r*. On the passage of an impulse through the receiving circuit *i*, the coherer, which normally interrupts the local circuit *j*, causing thereby the translating device, *r*, and the intermediate

connections to be deenergized, is actuated and caused to complete the local circuit *j*, which operates through the relay magnet, *l*, its armature *o* to complete the working circuit *p* and energize or actuate the translating device *r*. During the actuation of the coherer, the constant decohering effect is maintained by the tapper or other form of decoherer employed, and on the cessation of the impulse in the receiving circuit, *i*, decoherence results.

In Fig. 5 I have illustrated an arrangement of circuits wherein the coherer is adapted to respond to slight electric undulations of any character; and particularly those maintained under high tension. The receiving circuit *i* is in series with the primary step-down transformer *s*, the secondary of which is connected to the actuating coil *a* and transmits thereto the undulations transmitted through the receiving circuit. The operation of the coherer and its associated apparatus is similar in this arrangement to that illustrated in Fig. 4. In this receiving system, however, I have so arranged the tapper or decoherer that its operation is periodically interrupted, the duration of its operative period being as long as is necessary to effect the necessary decoherence. Instead of placing the tapper in series with the coherer circuit, I have herein shown it in series with a circuit in shunt to the translating device *r* and in series with the interrupter *B*. This interrupter consists of the clock actuated contact disk, *t*, normally prevented from rotation by the armature *u* of the electro-magnet *v* but adapted on the excitation of said magnet to be released therefrom and to rotate at a predetermined rotation under the influence of any suitable clock-work train. The disk *t* carries the contact *w* suitably connected through a contact ring and brush with the tapper *m* and adapted to make contact once each revolution with the brush or wiper, *x*, suitably connected to the magnet coil *v*, and thereupon to complete the tapper circuit. It is obvious that on the excitation of the working circuit *p* the magnet *v* will be energized and the interrupter set in operation; which will cause a decohering effect to be maintained for a limited time once each revolution of the contact disk.

In Figs. 6 and 7 I have shown respectively the elevation and plan of an apparatus comprising the transformer *s*, the tapper *m*, the coherer and its actuating coil *a*, described in connection with Fig. 5. The tapper is herein shown as engaging the pin or stud, *n*, suitably secured to the spool upon which the coil *a* is wound.

It will be obvious that I am in no wise limited to the specific details which I have herein illustrated, or to the assemblage of parts as a whole, since these have been sub-

mitted for illustrative purposes only and may be widely varied and altered without departing from the spirit of my invention.

Claims:

1. In a receiver for electrical impulses, the combination with a receiving circuit of a second circuit containing a coherer normally interrupting the same, said coherer being out of electrical contact with said receiving circuit, but electro-magnetically actuated thereby to complete said second circuit.

2. The combination with a receiving circuit of a second circuit out of electrical contact therewith normally interrupted by an imperfect contact, said contact comprising a plurality of loose magnetic particles within the magnetic influence of the receiving circuit.

3. In a receiver for electrical impulses the combination with a receiving circuit of a second circuit normally interrupted by an imperfect contact, said contact comprising a plurality of loose magnetic particles within the magnetic influence of the receiving circuit and adapted to be brought into a state of coherence on the passage of an impulse through said receiving circuit.

4. In a receiver for electrical impulses, the combination with a receiving circuit of a second circuit containing a coherer normally interrupting the same, said coherer being out of electrical contact with said receiving circuit, and a coherer actuating coil in said receiving circuit surrounding said coherer.

5. In a receiver for electrical impulses, the combination with a receiving circuit of a second circuit out of electrical contact therewith, and normally interrupted by an imperfect contact, said contact comprising loose magnetic materials in non-conductive contact and an actuating coil in said receiving circuit surrounding said contact.

6. In a receiver for electrical impulses, the combination with a receiving circuit of a second circuit containing a coherer normally interrupting the same, and a coherer actuating coil in said receiving circuit surrounding said coherer, said coherer and coil being relatively adjustable.

7. In a receiver for electrical impulses the combination with a receiving circuit of a second circuit containing a coherer normally interrupting the same, said coherer being out of electrical contact with said receiving circuit, but electro-magnetically actuated thereby to complete said second circuit and decohering means actuated by said second circuit.

8. In a receiver for electrical impulses the combination of an imperfect electrical

contact, means for shaking the contact actuated by a circuit energized on the making of said contact and means for periodically interrupting the operation of said shaking means.

9. In a receiver for electrical impulses, a receiving circuit, a second circuit containing a coherer normally interrupting the same, said coherer comprising a plurality of loose magnetic particles within the magnetic influence of said receiving circuit, and decohering means actuated by said second circuit subject in its operation to periodic interruption.

10. In a receiver for electrical impulses, a receiving circuit, a secondary circuit, a step-down transformer interposed between the receiving circuit and secondary circuit, a local circuit normally interrupted by a coherer within the electro-magnetic influence of the secondary circuit.

11. In a receiver for electrical impulses, an actuating coil or helix wound upon a core of magnetic material, said core having a gap within said coil and a coherer located within said coil and in the gap formed in said core.

12. In a receiver for electrical impulses, a hollow tube or sleeve containing magnetic materials normally in loose non-conductive contact interposed between conducting plugs or terminals, an actuating coil surrounding said sleeve, a projecting stud or pin associated with said sleeve and a tapper for engaging said pin.

13. In a receiver for electrical impulses, the combination with a receiving circuit, of a second circuit normally interrupted by an imperfect contact, said contact comprising a plurality of loose, non-initially magnetized magnetic particles within the magnetic influence of the receiving circuit and adapted to be brought into a state of coherence on the passage of an impulse through said receiving circuit.

14. In a receiver for electrical impulses the combination with a receiving circuit of a second circuit out of electrical contact with said receiving circuit and containing an imperfect contact, the interruption and completion of said second circuit through said imperfect contact being caused through the electro-magnetic control of said imperfect contact by said receiving circuit.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES D. LANNING.

Witnesses:

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EVERETT S. EMERY.